

REMARKS

Claims 1-28, and 30-32 are currently pending in the present application. Claims 1 and 28 have been amended herein and Claims 18-27 have been cancelled. Applicants wish to thank the Examiner for the opportunity to discuss the case in a telephone interview with Applicants' representative on April 14, 2003. The present amendments and remarks are consistent with that discussion, in which the Examiner agreed that the specification supports the use of organic reducing agents that are not activated by plasma.

Information Disclosure Statement

The Examiner objected to the Information Disclosure Statement filed on January 29, 2002 because it did not include a concise explanation of the relevance of DE 41 08 73, which is in German. In addition, the Examiner found that with respect to reference numbers 15 and 29 of the IDS filed January 29, 2002, Applicants had not made a clear statement on the record that the month of publication is not in issue.

Applicants submit herewith a new IDS listing the three references at issue. For the purposes of Examination the Examiner is requested to assume that the date of publication of reference numbers 2 (SOI Technology, IBM's Next Advance In Chip Design) and 3 (slides from Sudani et al. "Oral Presentation of Dual Damascene Process") is more than one year prior to the filing date of the present application. Thus, the month of publication of the references is not an issue.

Reference number 1 (DE 41 08 73) discloses the removal of copper oxide by a liquid phase treatment, such as with an acidic solution or alcohol. In the case of organic carboxylic acids, copper oxide is dissolved in an acidic solution and forms copper carboxylates that dissolve in the solution.

Claim Rejections Under 35 U.S.C. §112

Claims 1-17 were rejected under 35 U.S.C. §112, first paragraph, as the Examiner found that the use of the term "stable" was not supported by the specification. Without acquiescing in the Examiner's position, the term "stable" has been removed from Claim 1, thus obviating this rejection.

Claim Rejections Under 35 U.S.C. §103

All pending claims were rejected over the base combination of Sundararajan (US. Patent Application 2002/0027286) in view of Mori et al. (U.S. Patent No. 6,006,763). Particular claims were rejected over this combination in view of one or more additional references.

Sundararajan teaches a process for producing an integrated circuit that comprises forming a copper oxide and reducing it by exposure to hydrogen or ammonia plasma prior to the formation of a silicon carbide layer. Mori teaches a method of surface treatment, including reduction of metal oxide, in which a plasma is generated in a gas comprising an organic compound, such as decane.

In contrast to the plasma reducing agent used by Mori, Applicant's claimed invention utilizes a vapor phase organic reducing agent in which a plasma discharge is not formed. Independent Claims 1 and 28 have been amended herein to explicitly recite that a plasma discharge is not formed in the reducing gas. Mori does not teach or suggest a reducing agent in which a plasma discharge is not created and the rejection of Claims 1 and 28 should be withdrawn.

The present amendments to the claims are fully supported by the specification as filed. As discussed with the Examiner, the present application describes several distinct methods for reducing copper oxide. The primary embodiment, and the one to which the present claims are directed, relates to the reduction of copper oxide by exposure to one or more organic reducing agents. This embodiment is described, for example, on pages 8 and 9 of the specification and is exemplified in Examples 1 through 7. The application proposes the use of H₂ plasma as an alternative reduction process. This embodiment is described under the heading 'Alternative Reduction Chemistries' on page 13 and is exemplified in Examples 8 and 9.

As the disclosure and Examples are directed to one embodiment or the other, it is clear from the specification that these are two distinct embodiments. Thus, the specification supports the reduction of copper oxide using a vapor comprising organic reducing agents in which a plasma discharge is not created. In the interview with Applicants' representative, the Examiner agreed with this conclusion.

As the remaining claims depend from one of independent Claims 1 and 28, Applicants submit that they are in condition for allowance.

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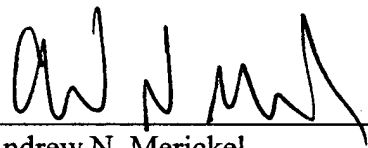
Conclusion

In view of the present amendments, this application is believed to be in condition for allowance. However, if any issues remain, the Examiner is invited to contact Applicants' counsel at the number provided below in order to resolve such issues promptly.

Respectfully submitted,

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